

VALIDATION OF A NEW EQUATION TO CALCULATE THE MAXIMUM OXYGEN UPTAKE

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Introduction

The main regression equations to estimate the maximum oxygen uptake (VO₂max) have been obtained with the total population studied (1-3). A limitation of these studies is the validity, since the prediction equations were carried out with a particular population and they were validated with themselves, because the samples did not tend to be very large. The cross validation must be used to check the accuracy of a prediction equations when they are applied to different populations. The aim of this study was to determine the validity of the maximum oxygen uptake prediction equation obtained with cross validation.

Methods

784 subjects participated in the study (656 men: 23 ± 8.2 years, 175.4 ± 7.9 cm and 69.4 ± 10 kg; 128 women: 20.7 ± 7.5 years, 163.7 ± 8.4 cm and 57 ± 9.5 Kg). Each subject performed an incremental test until exhaustion in treadmill or cicloergometer. The expired air was analyzed with a gas analyzer Jaeger Oxicon Pro. It was selected randomly half of the sample (n=388) to carry out a step by step multiple regression analysis and obtained the following equation:

$$\text{VO}_2\text{max (mL}\cdot\text{min}^{-1}) = -6833 - 878 (\text{sex}) + 12.6 (\text{weight}) + 36.5 (\text{size}) - 19.1 (\text{HRrest}) + 26.2 (\text{HRmax})$$

This equation was applied to rest 50 % of the studied population. Pearson's correlation was calculated between the VO₂max calculate with the equation and VO₂max obtained in the maximal test. It was obtained the retraction and variation coefficients by the Thomas and Nelson procedure.

Results

The R² was 0.617 and the variation coefficient, that compares the dispersion of the two methods, was 15.3 %, with a technical error of estimation of 634 mL·min⁻¹. The obtained correlation between the calculated and estimated values was 0.789 (r² = 0.623) and the retraction coefficient -0.6 %.

Discussion

The results of the retraction and variation coefficients are within the accepted values to estimate the VO₂max using regression equations. It has been suggested that these values should fall between 10 and 20 % (4). Fairbairn et al. (1994) found in healthy subjects that the best prediction of VO₂max is obtained with equations separated by sex, including age, height and weight. In our study, in addition to these variables, we have included the resting and maximum heart rate. In conclusion, we propose a new equation to obtain VO₂max.

References

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